



## EV BUSINESS MODELS STUDY OVERVIEW

*The first meeting of the Staff Workgroup and C2ES*

May 15, 2014

JTC Office, 3309 Capitol Blvd. SW  
Olympia, Washington

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9:00 a.m.      **Welcome and Introductions**

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9:15 a.m.      **EV Business Models Study Overview**

*Nick Nigro, C2ES*

*Matt Frades, C2ES*

Interactive presentation of project overview, including C2ES's relevant experience, project approach, and project management

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10:00 a.m.      **Task 1: Evaluate Current Status of Electric Vehicle Charging in Washington**

**Objective:** Review approach to EV charging evaluation in Washington. Discuss considerations for development of stakeholder network, public charging network database, and interactive map tool. In particular, discuss data collection approach, identify best available data, and data sources.

Discussion Questions:

- Who are the best stakeholders to engage in the following areas: charging infrastructure providers, charging station host sites, etc.? Are there gaps in the data that we'll need to fill?
- What kinds of data is the most useful to assemble?

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10:30 a.m.      **Tasks 2 & 3: Develop Business Models and Identify Public & Private Roles**

**Objective:** Review approach to business model development and roles of public and private sectors.

Discuss considerations for business model workshop, scope of business models, and preferences related to market focus (e.g., workplace versus multi-unit dwelling).

Discussion Questions:

- Should this project investigate EV charging commercial viability in public locations, at workplaces, and in multi-unit dwellings, or a subset of these locations? What are the key factors that affect the commercial viability of EV charging in public, at workplaces, and in multi-unit dwellings?
- C2ES recently conducted an all-day workshop at Harvard Business School on business models for alternative fuel vehicles. Two staffers from the Washington State Legislature attended. How can we improve upon this workshop and/or tailor it more for Washington State? Is the case study approach the right one for the business model workshop?

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12:00 p.m.      **Adjourn**

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## Meeting Participants

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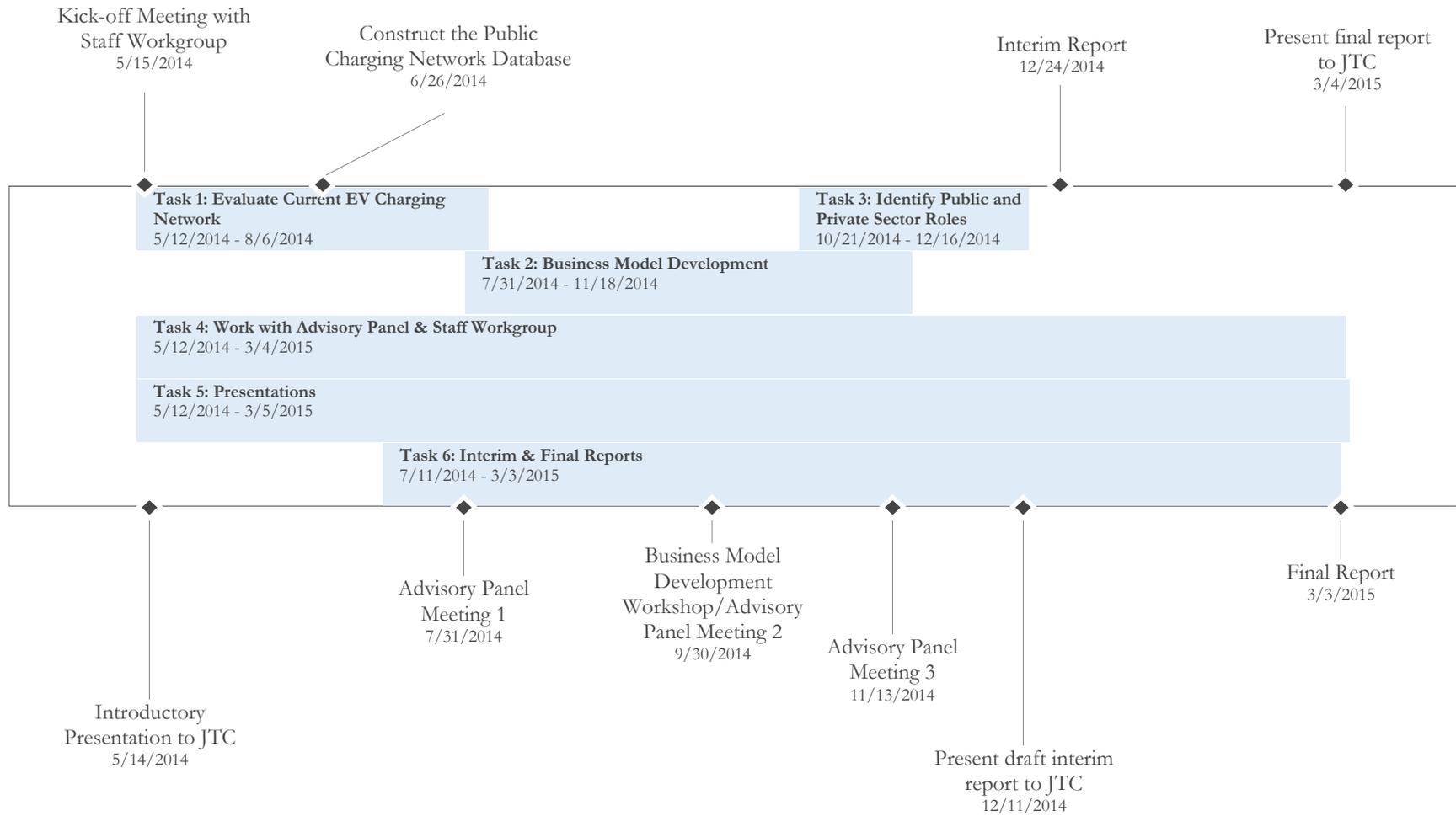
## About C2ES

*The Center for Climate and Energy Solutions (C2ES) is an independent non-profit, non-partisan organization promoting strong policy and action to address the twin challenges of energy and climate change. Launched in November 2011, C2ES is the successor to the Pew Center on Global Climate Change, long recognized in the United States and abroad as an influential and pragmatic voice on climate issues.*

*The Center brings together business leaders, policy makers, scientists, and other experts to bring a new approach to a complex and often controversial issue. Our approach is based on sound science, straight talk, and a belief that we can work together to protect the climate while sustaining economic growth. The Center is supported by a wide range of philanthropic, corporate and individual contributors.*

*Headquartered in Arlington, Virginia, the Center's mission is to be a credible, independent voice and catalyst for pragmatic policies and actions to protect the global climate and to ensure clean, secure and affordable energy. We are a trusted source of analysis and advice, an effective bridge between diverse interests, and a long-time leader in catalyzing constructive business engagement. Few organizations have played as central a role in the climate policy debate in Washington, at the state level, and internationally. The Center was recognized in 2011, 2012, and 2013 as one of the world's top environmental think tanks in a survey conducted by the University of Pennsylvania.*

## Project Timeline



## **Task 1: Evaluate Current Status of Electric Vehicle Charging in Washington**

1. **Establish a stakeholder network.** C2ES will establish a stakeholder network of the key public charging entities in Washington State, including charging infrastructure providers, charging station host sites, Washington DOT, and Idaho National Laboratory. (Idaho National Laboratory is the main entity responsible for the U.S. Department of Energy's EV Project.)
2. **Construct the Public Charging Network Database.** C2ES will engage with this stakeholder network to collect and organize a database of key information on the public charging infrastructure in Washington. C2ES will design the database to inform decision-makers and to be easily updated and maintained. This Public Charging Network Database will include a wide range of relevant information, such as:
  - a. Charging technology (Level 2 or DC Fast-Charge)
  - b. Physical location and category (e.g., shopping mall or convenience store)
  - c. Operational category (e.g., owner-operated or network managed)
  - d. Funding sources (i.e., pay per charge, subscription, amenity, or combination)
  - e. Charging utilization where possible
  - f. Date of installation for use in longitudinal analyses
3. **Create interactive maps to assess suitability of existing public charging network.** Relying on its Public Charging Network Database, C2ES will assess the adequacy of the existing public charging network. C2ES will work with the Washington DOT to identify the location of EV drivers by Zip Code or County in order to assess charging coverage for existing EV drivers. C2ES will use these geographic data to create interactive maps in order to assess the suitability of the existing public charging network.
  - a. Potential coverage of individual charging stations, shown using circles based on electric miles traveled, charging speed, and other factors. Charging network needs depend largely on the EV technology that is considered. That is, 100-mile all-electric vehicle drivers are likely more interested in an extensive DC fast charging network, while extended range or plug-in hybrid electric vehicle drivers are unable to use DC fast charging stations at this time.
  - b. Changes in the public charging network over time through a user-customizable "slider." The public charging network in Washington is changing quickly, so assessing changes over time will allow for a better understanding of the evolution of the EV market.
4. **Provide insights into role of public charging networks in encouraging electric vehicle adoption.** C2ES will use the Public Charging Network Database to provide insights into the role of public charging in encouraging EV adoption, electric miles traveled, and travel to destinations with public charging. C2ES will use the Public Charging Network Database to:
5. **Summarize findings in a white paper, post the interactive maps online, and create a complementary PowerPoint presentation.**

## Tasks 2 & 3: Develop Business Models and Identify Public & Private Roles

**C2ES's barriers research:** C2ES will identify private investment barriers specific to and/or particularly relevant to Washington, including the market effects of prior state investments that have been made in EV charging infrastructure. See C2ES's 2013 report, *Alternative Fuel Vehicle & Fueling Infrastructure Deployment Barriers & the Potential Role of Private Sector Financial Solutions*.

**EV Infrastructure Gap:** The EV infrastructure gap includes three categories—public charging, workplace charging, and multi-unit dwelling charging—each of which faces specific hurdles such as regulatory or corporate policy constraints and misaligned incentives. C2ES will consider factors that affect commercial viability of this kind of EV charging infrastructure:

1. **Residential electricity competition:** Electricity only cost less than \$0.08 per kilowatt-hour in Washington in February 2014. Since an EV can travel about 3.5 miles on each kilowatt-hour of energy and Americans travel only 30 miles per day on average, an EV driver's daily travel cost is about \$0.70. Since most people can charge at home quite inexpensively, they are unlikely to pay higher prices for frequent charging outside the home. EV drivers may be willing to pay a high price to increase their range for occasional road trips, but that will likely be infrequent, keeping near-term demand for public EV charging stations low.
2. **A small market:** As of April 2014, over 190,000 EVs were on the road in the United States, with over 8,000 public chargers. Industry forecasts of future EV sales vary widely; therefore, great uncertainty exists about whether and when EVs will be a major segment of the auto market. This small market can mean low utilization of EV charging and uncertain revenue outside the home in the early months and years of any given charging station.
3. **Cost of charging stations:** The cost for each charging station installation depends on local physical and regulatory conditions. A typical Level 2 charging station provides power to an EV at a rate of 3 to 6 kilowatts and can have installation costs ranging from \$500 to \$5,000, depending on the electrical work involved. While creating a network of \$500 Level 2 charging stations with low initial utilization may be financial viable, it may be far more challenging to make the charging network profitable with stations that cost \$5,000. Similarly, a DC fast charging station capable of providing power at a rate of up to 90 kilowatts have a variable installation cost between \$50,000 and \$150,000.
4. **High cost of capital.** Investors charge a higher interest rate if they perceive the technology as risky, and the typical loan terms are often unrealistically short for EV infrastructure projects whose revenue will likely grow slowly. The resulting high cost of capital for a potential owner of EV infrastructure can easily derail an otherwise viable project.

**Business Model Workshop:** C2ES will create materials for and facilitate an all-day workshop with the goal exploring and evaluating specific ways that new financing models can strengthen the business case for investment in EV charging. The workshop will consist of group breakout sessions on the role of public-private finance programs and other business concepts in three use cases based on charging revenue sources: pay-per-use, subscription-based, and amenity charging. The entire workshop audience will discuss the most promising models and identify next steps for C2ES to pursue. C2ES will explore the 2-3 most promising business models and write a brief summary document on each.

**Public & Private Roles:** C2ES will identify interventions that can lower investors' risks thus causing the cost of financing to decrease, which in turn increases the size of the market and further reduces investors' risk. In this virtuous cycle, larger scale and greater liquidity draw even more investors to financial products and steadily lower the cost of financing, which reduces the need for public investments in EV charging infrastructure. While the ultimate profitability of EV charging infrastructure projects is dependent on many factors, interventions by the public sector can play a major role in creating a cycle of expansion of private investment that both satisfies and spurs growing demand.

1. **Execute financial analysis on business model viability to identify funding gaps or other needs.** C2ES and Cadmus Group will work closely with the Advisory Panel to develop and analyze scenarios based on executing the business model in the market. The scenarios will focus on factors that affect revenue, dependencies on capital and operational costs, dependencies on vehicle and electrical grid technologies, and short- and long-term viability of the business. The output of the financial analysis will show the major risk factors that discourage private investment, thereby introducing funding gaps. The output will also identify how targeted public sector interventions could address these risk factors.
2. **Identify public sector role in addressing barriers to private investment.** C2ES will identify ways that public sector stakeholders can help to address barriers through targeted financial policies and programs.